SECOND GRADE SCIENCE

GRADE LEVEL CONTENT EXPECTATIONS

2 SCIENCE

v.12.07

Welcome to Michigan's K-7 Grade Level Content Expectations

SCIENCE PROCESSES

PHYSICAL SCIENCE

LIFE SCIENCE

EARTH SCIENCE

Purpose & Overview

In 2004, the Michigan Department of Education embraced the challenge of creating Grade Level Content Expectations in response to the federal No Child Left Behind Act of 2001. This act mandated the existence of a set of comprehensive state grade level assessments in mathematics and English language arts that are designed based on rigorous grade level content. In addition, assessments for science in elementary, middle, and high school were required. To provide greater clarity for what students are expected to know and be able to do by the end of each grade, expectations for each grade level have been developed for science.

In this global economy, it is essential that Michigan students possess personal, social, occupational, civic, and quantitative literacy. Mastery of the knowledge and essential skills defined in Michigan's Grade Level Content Expectations will increase students' ability to be successful academically, and contribute to the future businesses that employ them and the communities in which they choose to live.

Reflecting best practices and current research, the Grade Level Content Expectations provide a set of clear and rigorous expectations for all students, and provide teachers with clearly defined statements of what students should know and be able to do as they progress through school.

Development

In developing these expectations, the Scholar Work Group depended heavily on the *Science Framework for the 2009 National Assessment of Educational Progress* (National Assessment Governing Board, 2006) which had been the gold standard for the high school content expectations. Additionally, the *National Science Education Standards* (National Research Council, 1996), the Michigan Curriculum Framework in Science (2000 version), and the *Atlas for Science Literacy,* Volumes One (AAAS, 2001) and Two (AAAS, 2007), were all continually consulted for developmental guidance. As a further resource for research on learning progressions and curricular designs, *Taking Science to School: Learning and Teaching Science in Grades K-8* (National Research Council, 2007) was extensively utilized. The following statement from this resource was a guiding principle:

"The next generation of science standards and curricula at the national and state levels should be centered on a few core ideas and should expand on them each year, at increasing levels of complexity, across grades K-8. Today's standards are still too broad, resulting in superficial coverage of science that fails to link concepts or develop them over successive grades."

Michigan's K-7 Scholar Work Group executed the intent of this statement in the development of "the core ideas of science...the big picture" in this document.

MICHIGAN Department of Education
Office of School Improvement

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Curriculum

Using this document as a focal point in the school improvement process, schools and districts can generate conversations among stakeholders concerning current policies and practices to consider ways to improve and enhance student achievement. Together, stakeholders can use these expectations to guide curricular and instructional decisions, identify professional development needs, and assess student achievement.

Assessment

The Science Grade Level Content Expectations document is intended to be a curricular guide with the expectations written to convey expected performances by students. Science will continue to be assessed in grades five and eight for the Michigan Educational Assessment Program (MEAP) and MI-Access.

Preparing Students for Academic Success

Within the hands of teachers, the Grade Level Content Expectations are converted into exciting and engaging learning for Michigan's students. As educators use these expectations, it is critical to keep in mind that content knowledge alone is not sufficient for academic success. Students must also generate questions, conduct investigations, and develop solutions to problems through reasoning and observation. They need to analyze and present their findings which lead to future questions, research, and investigations. Students apply knowledge in new situations, to solve problems by generating new ideas, and to make connections between what they learn in class to the world around them.

Through the collaborative efforts of Michigan educators and creation of professional learning communities, we can enable our young people to attain the highest standards, and thereby open doors for them to have fulfilling and successful lives.

Understanding the Organizational Structure

The science expectations in this document are organized into disciplines, standards, content statements, and specific content expectations. The content statements in each science standard are broader, more conceptual groupings. The skills and content addressed in these expectations will, in practice, be woven together into a coherent, science curriculum.

To allow for ease in referencing expectations, each expectation has been coded with a discipline, standard, grade-level, and content statement/expectation number.

For example, **P.FM.02.34** indicates:

P - Physical Science Discipline

FM-Force and Motion Standard

02-Second Grade

34-Fourth Expectation in the Third Content Statement

Content statements are written and coded for Elementary and Middle School Grade Spans. Not all content expectations for the content statement will be found in each grade.

Elementary (K-4) Science Organizational Structure

Discipline 1 Science Processes	Discipline 2 Physical Science	Discipline 3 Life Science	Discipline 4 Earth Science
Standards and Statements *(and number of Content Expectations in each Statement)*			
Inquiry Process (IP) **Inquiry Analysis and Communication (IA)** **Reflection and Social Implications (RS)**	**Force and Motion (FM)** Position (2) Gravity (2) Force (8) Speed (3) **Energy (EN)** Forms of Energy (2) Light Properties (2) Sound (2) Energy and Temperature (3) Electrical Circuits (2) **Properties of Matter (PM)** Physical Properties (8) States of Matter (3) Magnets (4) Material Composition (1) Conductive and Reflective Properties (3) **Changes in Matter (CM)** Changes in State (1)	**Organization of Living Things (OL)** Life Requirements (6) Life Cycles (2) Structures and Functions (2) Classification (2) **Heredity (HE)** Observable Characteristics (3) **Evolution (EV)** Environmental Adaptation (2) Survival (2) **Ecosystems (EC)** Interactions (1) Changed Environment Effects (1)	**Earth Systems (ES)** Solar Energy (2) Weather (4) Weather Measurement (2) Natural Resources (4) Human Impact (2) **Solid Earth (SE)** Earth Materials (4) Surface Chages (2) Using Earth Materials (2) **Fluid Earth (FE)** Water (4) Water Movement (2) **Earth in Space and Time (ST)** Characteristics of Objects in the Sky (2) Patterns of Objects in the Sky (5) Fossils (2)

Science Processes: Inquiry Process, Inquiry Analysis and Communication, Reflection, and Social Implications

These second grade expectations increase students' skills for inquiry by asking them to make quantitative measurements and organize data into charts and graphs that will provide students with evidence when communicating scientific ideas. Second graders are given the opportunity to plan and conduct simple investigations with data collection within the physical, life, and Earth science content. The experiences in the classroom inspire a sense of wonder and enthusiasm that leads to the opportunity for students to generate questions based on observations.

Physical Science: Properties of Matter

Second grade students expand their understanding of describing matter to include state of matter, texture, hardness, and the measure of length, volume, and weight of different substances. Given the opportunity to observe, measure, and describe common objects, student descriptions become more detailed and astute. Young learners realize that they can add to their descriptions of objects when given the measuring tools necessary to record data and provide evidence of their thinking.

Second grade students are introduced to the concept of classifying objects as a single substance and a mixture of one or more substances. The intent of the content expectation is to introduce the young learner to the concept that not all objects are made of one substance, and may be a mixture of two or more substances.

Life Science: Organization of Living Things and Heredity

Second grade students build on their prior knowledge of the needs of animals and the life cycle of animals from their first grade experiences and apply it to plants. The second grade life science curriculum concentrates on the needs of plants, life cycle of flowering plants (seed, plant, flower, fruit, seed), and characteristics of plants that are passed from parent to young. Young learners gain an understanding of the relationship between all living things through direct experience with organisms in the classroom leading to an understanding of how individual organisms maintain and continue life.

Earth Science: Solid Earth and Fluid Earth

The main concept in Earth science for the second grade student is the description and identification of major landforms and bodies of water found on Earth. As children become more familiar with the Earth and its surface features, they will be able to recognize the slow and rapid changes that occur. Students are particularly focused on water in its three states and the motion of water over land. These content expectations give the students the opportunity to observe rapid changes such as movement of water down a soil covered slope, and gradual changes such as the wind erosion of rock and soil.

The second grade content expectations provide a common opportunity for students to use their observation skills. Furthering development of these skills from previous grades, students make observations through measurement providing evidence to substantiate their understandings.

Second Grade Science Standards, Statements, and Expectations

Note: *The number in parentheses represents the number of expectations.*

Discipline 1: Science Processes (S)
- **Standard: Inquiry Process (IP)**
  - 1 Statement (6)
- **Standard: Inquiry Analysis and Communication (IA)**
  - 1 Statement (3)
- **Standard: Reflection and Social Implications (RS)**
  - 1 Statement (4)

Discipline 2: Physical Science (P)
- **Standard: Properties of Matter (PM)**
  - Physical Properties (4)
  - Material Composition (1)

Discipline 3: Life Science (L)
- **Standard: Organization of Living Things (OL)**
  - Life Requirements (1)
  - Life Cycles (1)
- **Standard: Heredity (HE)**
  - Observable Characteristics (1)

Discipline 4: Earth Science (E)
- **Standard: Solid Earth (SE)**
  - Surface Changes (1)
- **Standard: Fluid Earth (FE)**
  - Water (4)
  - Water Movement (2)

SCIENCE PROCESSES

Inquiry Process

K-7 Standard S.IP: *Develop an understanding that scientific inquiry and reasoning involves observing, questioning, investigating, recording, and developing solutions to problems.*

S.IP.E.1 Inquiry involves generating questions, conducting investigations, and developing solutions to problems through reasoning and observation.

S.IP.02.11 Make purposeful observation of the natural world using the appropriate senses.
S.IP.02.12 Generate questions based on observations.
S.IP.02.13 Plan and conduct simple investigations.
S.IP.02.14 Manipulate simple tools (ruler, meter stick, measuring cups, hand lens, thermometer, balance) that aid observation and data collection.
S.IP.02.15 Make accurate measurements with appropriate units (meter, centimeter) for the measurement tool.
S.IP.02.16 Construct simple charts and graphs from data and observations.

Inquiry Analysis and Communication

K-7 Standard S.IA: *Develop an understanding that scientific inquiry and investigations require analysis and communication of findings, using appropriate technology.*

S.IA.E.1 Inquiry includes an analysis and presentation of findings that lead to future questions, research, and investigations.

S.IA.02.12 Share ideas about science through purposeful conversation.
S.IA.02.13 Communicate and present findings of observations.
S.IA.02.14 Develop strategies and skills for information gathering and problem solving (books, internet, ask an expert, observation, investigation, technology tools).

Reflection and Social Implications

K-7 Standard S.RS: *Develop an understanding that claims and evidence for their scientific merit should be analyzed. Understand how scientists decide what constitutes scientific knowledge. Develop an understanding of the importance of reflection on scientific knowledge and its application to new situations to better understand the role of science in society and technology.*

S.RS.E.1 Reflecting on knowledge is the application of scientific knowledge to new and different situations. Reflecting on knowledge requires careful analysis of evidence that guides decision-making and the application of science throughout history and within society.

S.RS.02.11 Demonstrate scientific concepts through various illustrations, performances, models, exhibits, and activities.
S.RS.02.13 Recognize that when a science investigation is done the way it was done before, similar results are expected.
S.RS.02.15 Use evidence when communicating scientific ideas.
S.RS.02.16 Identify technology used in everyday life.

PHYSICAL SCIENCE — Properties of Matter

K-7 Standard P.PM: *Develop an understanding that all matter has observable attributes with physical and chemical properties that are described, measured, and compared Understand that states of matter exist as solid, liquid, or gas; and have physical and chemical properties. Understand all matter is composed of combinations of elements, which are organized by common attributes and characteristics on the Periodic Table. Understand that substances can be classified as mixtures or compounds and according to their physical and chemical properties.*

P.PM.E.1 Physical Properties- All objects and substances have physical properties that can be measured.

P.PM.02.12 Describe objects and substances according to their properties (color, size, shape, texture, hardness, liquid or solid, sinking or floating).

P.PM.02.13 Measure the length of objects using rulers (centimeters) and meter sticks (meters).
P.PM.02.14 Measure the volume of liquids using common measuring tools (measuring cups, measuring spoons).
P.PM.02.15 Compare the weight of objects using balances.

P.PM.E.4 Material Composition- Some objects are composed of a single substance, while other objects are composed of more than one substance.

P.PM.02.41 Classify objects as single substances (ice, silver, sugar, salt) or mixtures (salt and pepper, mixed dry beans).

LIFE SCIENCE — Organization of Living Things

K-7 Standard L.OL: *Develop an understanding that plants and animals (including humans) have basic requirements for maintaining life which include the need for air, water and a source of energy. Understand that all life forms can be classified as producers, consumers, or decomposers as they are all part of a global food chain where food/energy is supplied by plants which need light to produce food/energy. Develop an understanding that plants and animals can be classified by observable traits and physical characteristics. Understand that all living organisms are composed of cells and they exhibit cell growth and division. Understand that all plants and animals have a definite life cycle, body parts, and systems to perform specific life functions.*

L.OL.E.1 Life Requirements- Organisms have basic needs. Animals and plants need air, water, and food. Plants also require light. Plants and animals use food as a source of energy and as a source of building material for growth and repair.

L.OL.02.14 Identify the needs of plants.

L.OL.E.2 Life Cycles- Plants and animals have life cycles. Both plants and animals begin life and develop into adults, reproduce, and eventually die. The details of this life cycle are different for different organisms.

L.OL.02.22 Describe the life cycle of familiar flowering plants including the following stages: seed, plant, flower, and fruit.

Heredity

K-7 Standard L.HE: *Develop an understanding that all life forms must reproduce to survive. Understand that characteristics of mature plants and animals may be inherited or acquired and that only inherited traits are passed on to their young. Understand that inherited traits can be influenced by changes in the environment and by genetics.*

L.HE.E.1 Observable Characteristics- Plants and animals share many, but not all, characteristics of their parents.

L.HE.02.13 Identify characteristics of plants (for example: leaf shape, flower type, color, size) that are passed on from parents to young.

EARTH SCIENCE

Solid Earth

K-7 Standard E.SE: *Develop an understanding of the properties of earth materials and how those properties make materials useful. Understand gradual and rapid changes in earth materials and features of the surface of Earth. Understand magnetic properties of Earth.*

E.SE.E.2 Surface Changes- The surface of Earth changes. Some changes are due to slow processes, such as erosion and weathering, and some changes are due to rapid processes, such as landslides, volcanic eruptions, and earthquakes.

E.SE.02.21 Describe the major landforms of the surface of the Earth (mountains, plains, plateaus, valleys, hills).

Fluid Earth

K-7 Standard E.FE: *Develop an understanding that Earth is a planet nearly covered with water and that water on Earth can be found in three states, solid, liquid, and gas. Understand how water on Earth moves in predictable patterns. Understand Earth's atmosphere as a mixture of gases and water vapor.*

E.FE.E.1 Water- Water is a natural resource and is found under the ground, on the surface of the earth, and in the sky. It exists in three states (liquid, solid, gas) and can go back and forth from one form to another.

E.FE.02.11 Identify water sources (wells, springs, lakes, rivers, oceans).
E.FE.02.12 Identify household uses of water (drinking, cleaning, food preparation).
E.FE.02.13 Describe the properties (visible, flowing, melting, dew) of water as a liquid (lakes, rivers, streams, oceans).
E.FE.02.14 Describe the properties (hard, visible, freezing, ice) of water as a solid (ice, snow, iceberg, sleet, hail).

E.FE.E.2 Water Movement- Water moves in predictable patterns.

E.FE.02.21 Describe how rain collects on the surface of the Earth and flows downhill into bodies of water (streams, rivers, lakes, oceans) or into the ground.
E.FE.02.22 Describe the major bodies of water on the Earth's surface (lakes, ponds, oceans, rivers, streams).